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Draft Model Comprehensive Plan Ground Water Amendment 9/30/92

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**MODEL COMPREHENSIVE PLAN GROUND WATER AMENDMENT**

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Prepared by:  
Eastern Shore of Virginia  
Ground Water Study Committee

Technical Assistance Provided by:

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GROUND WATER

Background

Ground water is the only source of supply for domestic, industrial, and agricultural water use on the Eastern Shore of Virginia. A total population of approximately 47,000 people use this ground water. Because of the limited supply of ground water, in 1976 the Virginia State Water Control Board designated the Eastern Shore of Virginia a "Ground Water Management Area". The Eastern Shore was the second area in Virginia to be declared a ground water management area. This declaration was based on the findings that:

- Ground water level declines have been observed in two sections of Accomack County;
- Interference between wells has been observed in the same two sections of Accomack County;
- Some evidence of localized ground water contamination has been observed in the water table aquifer of Accomack County but not in the confined aquifers;
- Even though the ground water supplies in Accomack County are not overdrawn and are not expected to be in the near future, it should be recognized that they may overdraw in some areas in the future if water withdrawals are not distributed throughout the region. Further, saltwater intrusion has not been observed to date but may occur in the future if heavy ground water withdrawals are concentrated in any one area.

At the request of Accomack and Northampton Counties, in 1990 the Accomack-Northampton Planning District Commission commissioned the development of a Ground Water Management and Supply Protection Plan to provide a comprehensive and practical series of options, alternatives and specific actions to promote compatibility between the Eastern Shore's water resources and the counties land use plans.

The bi-county Eastern Shore of Virginia Ground Water Study Committee was formed to oversee the development of the Ground Water Plan. The Committee consists of two members from each County's Board of Supervisors, one citizen appointed by each Board of Supervisors, the County Administrator from each county, and the Executive Director of the Accomack-Northampton Planning District Commission. On May 5, 1992 the Committee adopted the Ground Water Supply Protection and Management Plan for the Eastern Shore of Virginia. The plan includes a detailed analysis of Eastern Shore ground water resources and issues, and makes recommendations for the protection and management of the ground water.

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Eastern Shore of Virginia Ground Water System

The aquifers on the Eastern Shore are strongly influenced by geology, rainfall, and ground water use. There are basically two components to the Eastern Shore ground water system, the upper Columbia aquifer, and the lower Yorktown-Eastover aquifer.

Columbia Aquifer. The upper Columbia aquifer is unconfined, and is roughly 80 to 100 feet thick. This aquifer is used primarily for private on-site domestic wells, and agricultural irrigation. Approximately 2 million gallons per day are withdrawn from the Columbia aquifer by private on-site wells for domestic use. Some portion of the 8.7 million gallons per day withdrawn for irrigation comes from the Columbia aquifer.

Yorktown-Eastover Aquifer. The other aquifer is the Yorktown-Eastover Formation, a confined aquifer consisting of coarse shelly sand found in three layers that are separated by clay confining units. This aquifer can range in depth from 80 to 800 below the land surface, though most wells are pumping from layers between 150 and 300 feet deep.

Industrial withdrawals and public water supply wells are exclusively screened in the Yorktown-Eastover aquifer, while wells used for agriculture and private household use are withdrawn from the upper aquifer. Currently 4.5 million gallons per day are withdrawn from the Yorktown-Eastover aquifer for industrial use and public water supply.

Ground Water Recharge. Annual precipitation of 42 inches per year provides the recharge to the Eastern Shore aquifers. Approximately 12-24 inches per year of precipitation recharges the Columbia aquifer on the Eastern Shore of Virginia. At an average recharge rate of 17 inches per year, approximately 324 million gallons per day recharge the Columbia aquifer. Most of this water flows from the middle of the peninsula and discharges to the Chesapeake Bay and the Atlantic Ocean, providing an important source of fresh water for our tidal creeks and bays.

The clay confining layers that separate the Columbia aquifer from the Yorktown-Eastover serve to protect the aquifer from many of the water quality threats. But the clay confining units also act to impede the amount and rate of recharge to the aquifer. Only a small percentage of the precipitation that recharges the Columbia aquifer contributes to the recharge of the deeper confined aquifer. It is estimated that only 1.2 inches of precipitation recharge the Yorktown-Eastover aquifer annually.

Based upon the ground water modelling studies conducted, approximately 11 million gallons per day is recharged to the Yorktown-Eastover aquifer. However, it should be noted that this

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recharge value is based on average conditions across the entire Eastern Shore. Depending upon specific site conditions recharge to the Yorktown-Eastover aquifer may vary by a factor of two.

Ground Water Quality. Water quality in the Columbia aquifer is threatened by the many land uses that discharge, leach or dispose of contaminants to the ground water. Nitrate-nitrogen is the primary contaminant of concern to the Columbia aquifer. Sources of nitrate nitrogen include: septic systems; agricultural fertilizers; manure storage and animal disposal; septage lagoons; and landfills. In addition, pesticides and underground storage tanks are also threats.

The average nitrogen concentration in the ground water was calculated to be 2.0 milligrams per liter. The national drinking water standard for nitrogen is 10 milligrams per liter. On average the shallow ground quality is considered very good, however those areas located down slope from major nitrogen users or disposers may experience much higher nitrogen concentration.

### Ground Water Issues and Concerns

Local planning and elected officials on the Eastern Shore have been concerned for a number of years about the quality and availability of ground water. The Virginia State Water Control Board has conducted several studies and has developed a network of ground water monitoring wells on the Eastern Shore to document problems. In addition, through cooperative studies, the U.S. Geological Survey has developed reports and modelled the hydrogeology. The results of these investigations all agree that the major ground water issues are:

- Development Impacts, Septic Systems, Underground Tanks
- Industrial and Public Water Supply Wells
- Well Interference, Salt Water Intrusion
- Agriculture, Water Quality and Quantity
- Animal Wastes
- Adequate Water Supply for Future Demands

Each of these activities/concerns have an impact on water use and quality for either the upper aquifer, the lower aquifer or both. The Ground Water Supply Protection and Management Plan For the Eastern Shore of Virginia provides a review of each of these threats.

### Adequate Water Supply for Future Demands

Although it is estimated that there is only 11 million gallons per day available from the Yorktown-Eastover aquifer, current permits issued by the Virginia State Water Control Board would allow

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withdrawals of up 15.6 million gallon per day from this aquifer. If this were to occur, problems of well interferences and salt water intrusion, already observed near the largest industrial water users, will be greatly enhanced.

### Recommendations

Based upon the analyses conducted and the review of existing information, the study proposes the following actions:

#### Recommendations for Water Quality Protection:

- Pursue water conservation measures with major industrial users.
- Create an overlay protection zoning district to protect the spine recharge area to the Yorktown-Eastover aquifer;
- Restrict the siting of new mass drainfields in the spine recharge area;
- Review and revise county zoning and subdivision regulations;
- Require the registration of currently unregulated underground storage tanks;
- Incorporate ground water protection requirements into site plan review;
- Develop a private well ordinance to control the siting and construction of new wells;
- Support the implementation of agricultural nutrient management plans;
- Implement the provisions of the Chesapeake Bay Program.

#### Recommendations for Water Quantity Management

- Revise State Ground Water Act and Regulations to allow for re-evaluation of existing permits;
- Develop an Eastern Shore Water Management District to manage water withdrawals;
- Control the siting and development of new water supply wells to prevent well interference and reduce the threat of salt water intrusion;
- Continue the Accurate reporting of agricultural water withdrawals, by well location and depth.
- Continue the consideration of mandatory permitting of agricultural withdrawals after review of reporting data.
- Protect open space and undeveloped land in the spine recharge area.

#### General Recommendations

- Implement a land use/water quality data base;
- Develop a public education program on ground water.

#### Continued Research and Investigation

- Investigate the nature of recharge to the Yorktown-Eastover aquifer;

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- Research dilute salt water issues;
- Conduct additional hydrogeologic studies to better define the geology;
- Evaluate pesticide use on the Eastern Shore;
- Revise the nitrogen model used in the study over time.

Goals and Objectives for Ground Water Protection

The Eastern Shore of Virginia is situated over a very valuable ground water resource that is the sole source of water supply to the inhabitants and is also necessary for both industrial and agricultural use. Protection of the water quality and quantity requires the development of goals and objectives designed to maintain water quality, prevent over use of the aquifer, and provide for the future needs to accommodate growth on the Eastern Shore.

Goals and Objectives for Ground Water Quality Protection

Goal: Achieve industrial water conservation.

Objective: Work with local industry to develop industrial water conservation programs.

Goal: Protect the spine recharge area to the Yorktown-Eastover aquifer.

Objective: Restrict the siting of new mass drainfields, septage lagoons, and landfills, and protect open space in the spine recharge area.

Goal: Protect groundwater from development impacts such as overly dense development, failed septic systems, and leaking underground storage tanks.

Objective: Revise county zoning and subdivision regulations to include development standards and site plan review which provide for proper land development and proper siting and construction of septic systems, private wells, and underground storage tanks.

Goal: Minimize ground water impacts from agricultural activities.

Objective: Provide assistance in developing agricultural nutrient management plans and implement the provisions of the Chesapeake Bay Preservation Act.

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Goals: Educate the public about proper ground water use and education.

Objective: Develop a public education program on ground water.

Goals and Objectives for Ground Water Quantity Management

Goal: Re-evaluate existing ground water permits.

Objective: Revise State Ground Water Act and Regulations to allow for re-evaluation of existing permits.

Goal: Control the siting and development of new water supply wells to prevent well interference and reduce the threat of salt water intrusion by managing Eastern Shore ground water withdrawals.

Objective: Develop an Eastern Shore Water Management District to manage water withdrawals.

Goal: Accurately document agricultural ground water withdrawals.

Objective: Continue the accurate reporting of agricultural water withdrawals, by well location and depth.

Goal: Accurately document and record ground water quantity and quality.

Objective: Implement a land use/water quality data base;

Goal: Improve knowledge of Eastern Shore ground water system.

Objective: Investigate the nature of recharge to the Yorktown-Eastover aquifer, research dilute salt water issues, conduct additional hydrogeologic studies to better define the geology, evaluate pesticide use on the Eastern Shore, revise the nitrogen model used in the study over time.

Actions for Ground Water Protection and Management

Protection of the water quality and quantity will require the implementation of many actions designed to maintain water quality, prevent over use of the aquifer, and provide for the future needs to accommodate growth on the Eastern Shore.

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Actions for Ground Water Quality Protection

- Action: Develop an industrial water conservation program.
- Action: Develop regulations to restrict the siting of new mass drainfields, septage lagoons, and landfills, and to protect open space in the spine recharge area.
- Action: Revise county zoning and subdivision regulations to include development standards and site plan review which provide for proper land development and proper siting and construction of septic systems, private wells, and underground storage tanks.
- Action: Provide assistance in developing agricultural nutrient management plans and implement the provisions of the Chesapeake Bay Preservation Act.
- Action: Develop a public education program on ground water.

Actions for Ground Water Quantity Management

- Action: Participate in re-evaluation of existing ground water withdrawal permits.
- Action: Develop an Eastern Shore Water Management District to manage water withdrawals and control the siting and development of new water supply wells to prevent well interference and reduce the threat of salt water intrusion by managing Eastern Shore ground water withdrawals.
- Action: Document the accurate reporting of agricultural water withdrawals, by well location and depth.
- Action: Develop a land use/water quality data base by accurately documenting and recording ground water quantity and quality.
- Action: Investigate the nature of recharge to the Yorktown-Eastover aquifer, research dilute salt water issues, conduct additional hydrogeologic studies to better define the geology, evaluate pesticide use on the Eastern Shore, revise the nitrogen model used in the study over time.



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